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The 2016 Kumamoto, Japan, earthquakes and lessons learned for large earthquakes in urban areas

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A series of devastating earthquakes hit the Kumamoto districts in Kyushu, Japan, in April 2016. A M6.5 event occurred at 21:26 on April 14th (JST) and, 28 hours later, a M7.3 event occurred at 01:25 on April 17th (JST) at almost the same location at a depth of 10 km. Both earthquakes were felt at the town of Mashiki with a seismic intensity of 7 according to the Japan Meteorological Agency (JMA) scale. The intensity of 7 is the highest level in the JMA scale. Very strong accelerations were observed by the M6.5 event with 1,580 gal at KiKnet Mashiki station and 1,791 gal for the M7.3 event at Ohtsu City station. As a result, more than 8,000 houses totally collapsed, 26,000 were heavily damaged, and 120,000 were partially damaged. More than 170 people were killed by the two earthquakes.

The important lesson from the Kumamoto earthquake is that very strong ground motions may hit within a few days after a first large event. This can have serious impacts to houses already damaged by the first large earthquake. In the 2016 Kumamoto sequence, there were also many strong aftershocks including M5.8-5.9 events until April 18th. More than 180,000 people had to take shelter because of ongoing strong aftershocks.

We discuss both the natural and human aspects of the Kumamoto earthquake disaster caused by inland shallow large earthquakes. We will report on the lessons learned for large earthquakes hitting the metropolitan area of Tokyo, Japan.